Wind River Watershed Restoration Project, Volume II of III

Reports F and G

Annual Report
1998

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Wind River Watershed Restoration Project

1998 Annual Report

Volume II

November 1999

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Volume II

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Report F: Restoration -- Part I

Wind River Watershed Project

1998 Annual Report

November 1999

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Introduction

We report here our on-ground restoration actions. Part I describes work conducted by the Underwood Conservation District (UCD) on private lands. This work involves the Stabler Cut-Bank project. Part II describes work conducted by the U.S. Forest Service.

The Stabler Cut-Bank Project is a cooperative stream restoration effort between Bonneville Power Administration (BPA), the UCD, private landowners, the U.S. Forest Service (USFS), and the U.S. Fish and Wildlife Service (USFWS). The Stabler site was identified by UCD during stream surveys conducted in 1996 as part of a USFWS funded project aimed at initiating water quality and habitat restoration efforts on private lands in the basin. In 1997 the Wind River Watershed Council selected the project as a top priority demonstration project. The landowners were approached by the UCD and a partnership developed. Due to their expertise in channel rehabilitation, the Forest Service was consulted for the design and assisted with the implementation of the project. A portion of the initial phase of the project was funded by USFWS. However, the majority of funding (approximately 80%) has been provided by BPA and it is anticipated that additional work that is planned for the site will be conducted with BPA funds.

Site Description

The Stabler Cut-Bank Project is located at river mile 13 on the Wind River (Figure 1), 0.5 miles upstream from the Pacific Crest Trail Bridge (NW ¼, NW ¼, Section 23, T:4N, R:7E). The Wind River is a potential "scenic" river under the Wild and Scenic Rivers Act, with fisheries and scenic/geologic features recognized as outstanding remarkable values. This project incorporated natural channel design to preserve the river's aesthetic values and free flowing condition. Prior to restoration work, there was 1,900 feet of vertical bank averaging seven feet high on the outside bend of the river. The adjacent floodplain stretches several hundred feet on either side of the channel. The north bank consists of gravel, willows, alder, cottonwoods and conifers in that order of dominance as you move away from the river. Prior to project implementation, the south side was largely void of vegetation apart from grasses, scotch broom and very few isolated young conifers (Figure 2).

In 1940 the southern bank and floodplain was logged and converted to pasture and farmland. The removal of mature timber accelerated erosion and lateral migration of the channel. More than 500 feet of bank has been lost since the time of clearing. Residential development has increased over the past several years. Two houses are currently adjacent to the project site on the south side. There are plans for more with several two acre building lots for sale. The active floodplain has not been clearly identified, but according to landowner reports, the river has come out of its banks for the past two years and in some cases overland flow has coursed through the floodplain and re-entered the river near the Pacific Crest Trail bridge located about 0.5 miles downstream. This was also the case during the 28 December 1998 bankfull event. There is also a substantial amount of hyporheic water flow in the project area.

Figure 2. Aerial view of project site. Section "A" was treated with FMF structures in September 1998. Section "B" will be treated with structures in September 1999.

Williams (1986) hydrologic models indicate that the current length of meander is extremely out of balance (see Figures 3 and 4). Lateral channel migration has occurred as a result of the riparian timber harvest in 1940 (and the subsequent loss of bank stability) and increased peak flows resulting from upland timber harvest and road construction. The river will likely adjust to restore an appropriate length of meander. This will most likely occur as a meander cut-off at the lower end of the project reach (Castro 1998) and/or reactivate abandoned channels on the north side of the river. There are several head-cutting relief channels at the lower end of the reach that are active during bankfull events.

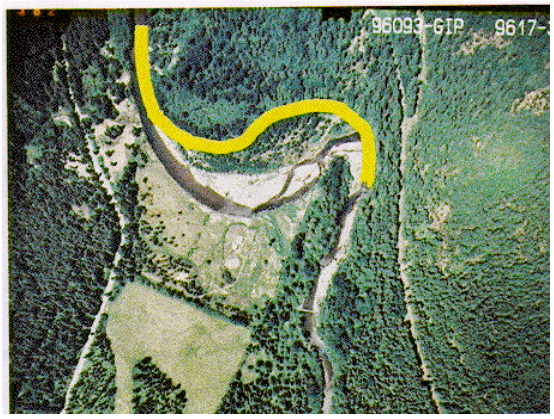

Figure 3. The line imposed on this photo represents where the river channel was in 1949. This line also resembles the length of meander derived from the Williams (1986) equations.

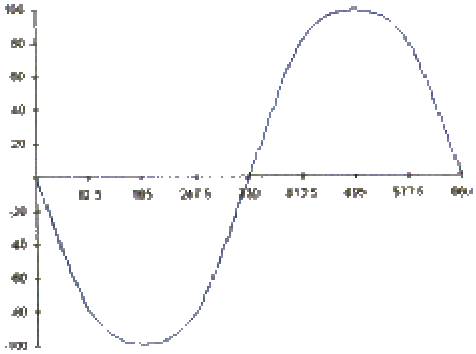

Figure 4. Length of meander derived from Williams equations. Using a bankfull area of 40 meters, length of meander should be 330 meters with a belt width of 99 meters.

This particular reach of river has seen substantial changes over the past 100 years. Aerial photos from 1944 (see Figure 5) indicate that the river channel has migrated more than 500 feet south since that time. The Stabler site lower bank stability is currently very poor due to loss of large living root mass, and is therefore prone towards lateral migration (see Figure 6). Prior to treatment this entire reach was characterized as having very high bankfull width to depth ratios (ranging from 29:1 to 100:1), very low slope (0.002), little riparian vegetation and significant bank erosion (average of 10 feet lost per year).

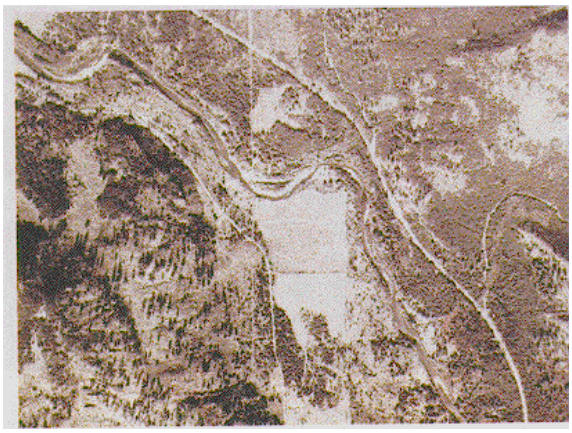

Figure 5. Aerial view of the project site in 1949.

Figure 6. Rapidly eroding cut-bank prior to project implementation, Summer 1997.

Project Goals and Objectives

The project goals were to:

1) Reduce bankfull width to depth ratios to less than 30:1 within the reach.
2) Increase bank stability to 80%.
3) Increase the frequency of large woody debris to greater than 100 pieces per mile to provide pools and cover for fish.
4) Increase stream shade to greater than 75%.
5) Monitor project effectiveness
6) Provide education for the public and local school students about watershed issues and current efforts to restore water quality and fish habitat.

Methods

Approximately 1,500 feet of vertical bank was treated by installing twelve instream log structures (identified as section "A" in Figure 2). The remaining 400-500 feet of bank in the project area (identified as section "B" in Figure 2) was excavated to a slope of 2:1 and treated with plantings and erosion control matting. Structure design was derived from similar structures Brian Bair and Paul Powers of the U.S. Forest Service have developed. The design has evolved from structure types identified by Rosgen (1993) and Abbe (1997). These structures have proven effective in similar projects within the watershed. This structure design was also agreed on due to permit requirements and our obligation to preserve the aesthetic values and free flowing character of the river. Rip-rap or bank-barb type structures would not fulfill this requirement.

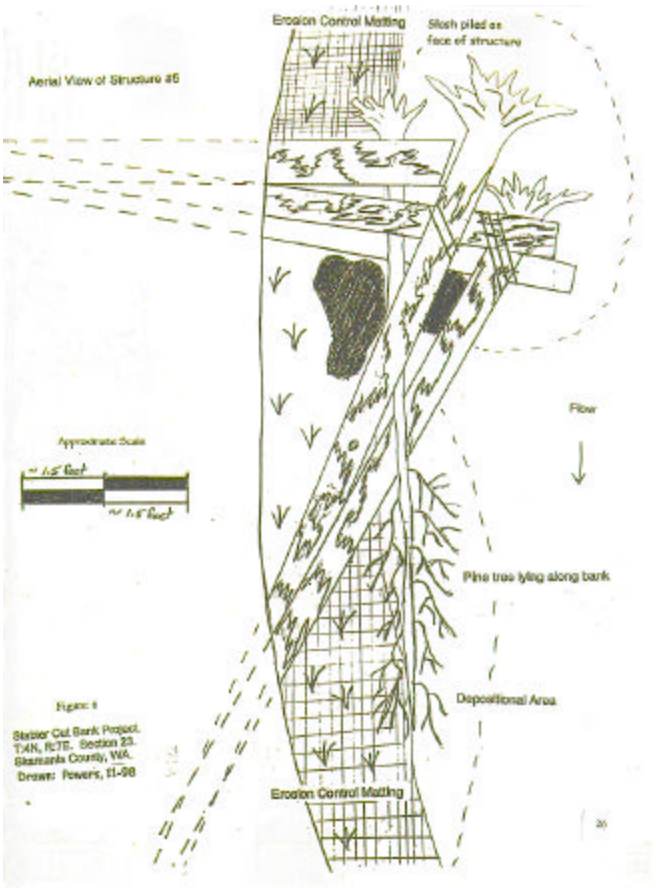

Figure 7. Sample structure design.

Figure 8. Structure immediately after construction, September 1998.

Structure construction and bank sloping were accomplished by using a 50,000-lb, tracked excavator. The excavator was used to trench into the bank and place the logs and rocks. Due to a shortage in materials we were unable to treat the entire length with large wood. Rather than spread materials thin, we opted to focus the wood in the upper project area, where we would be gaining the greatest benefits. Currently we are planning a second phase of this project. The purpose of the second phase is to treat the final 400-500 feet of bank with wood structures. This lower segment suffered continued erosion during the winter of 1998-1999 high flow events.

Structures were installed to reduce coarse and fine sediment delivery into the Wind River. A secondary benefit of installing the structures was to provide cover for adult and juvenile steelhead. Materials were donated by Longview Fibre Company, Bonneville Power Administration, Washington Department of Fish and Wildlife, U.S. Forest Service, and private landowners. Each structure has a basic frame (see Figure 7) constructed of large logs and boulders. Approximately 80 % of the framework for these structures is buried into the bank. The drawing in Figure 7 does not detail the magnitude of small poles, rootwads and green slash intertwined with the framework. Smaller debris was incorporated to mimic a natural logjam. The small debris also serves to protect the bank/structure interface from erosion.

Following the construction of the structures, erosion control matting was staked onto the stream bank, which had been pulled back to a slope of 2:1 and seeded with a native grass/legume mixture at a concentration of 200 seeds/sq. foot. Fifty pounds of locally adapted native

grass/legume seed was spread on the sloped riverbank and all other areas of disturbed soil. Erosion matting was staked down using a combination of 8-inch staples and live stakes. Live stakes consisted of black cottonwood (25%) and willow (75%) cuttings. In order to evaluate alternative erosion control methods e-mat was not used between structures 1 & 2 or structures 8 & 9. These sites were treated using only slash, grass seed and plantings. All other sites were treated with e-mat, grass seeds, plantings and green slash.

Silvicultural actions included planting of live cuttings and bare root seedlings. Cottonwood stakes, on average, were 24 inches in length by 4 inches in diameter; stakes were driven in so that 90% was buried. Willow cuttings were used heavily. Approximately five to eight cuttings were planted per square meter. Cuttings averaged 24 to 36 inches in length, with 75% of the stem buried. Many alder poles were also placed between structures to provide additional velocity protection by adding roughness and structure. Conifer seedlings were planted on the south side of the river in May 1999. Riparian planting extends at least 100 feet beyond the ordinary high water mark.

Results

Since the time of completion, the project has experienced three bankfull flow events (21 Nov 98, 2 Dec 98, and 28 Dec 98). Bankfull flow for this reach of the Wind River is approximately 5,000 cubic feet per second. All twelve structures performed remarkably well. The thalweg was moved away from the riverbank and deposition has occurred between each structure. Lateral bank migration appears to have ceased along the 1,500 feet treated with structures. The areas that have e-mat covered with slash and/or green trees (trees with branches intact), are very successful at holding the e-mat in place and trapping fine sediments. (see Figures 9, 10, and 11) Downstream of the structures, where the bank was pulled back and treated with erosion matting and plantings only, the bank has again become mostly vertical (see Figure 12). This demonstrates that wood is necessary in stabilizing banks within a “flashy” Wind River system. Bank stability for the entire project area has been increased from 5% to 80%. The amount of large woody debris has been increased from less than 14 pieces per mile to over 340 (125 pieces installed / 0.36 river miles), emulating an extensive jam.

Figure 9. Photo documentation station #2. Before project construction, August 1998.

Figure 10. Photo documentation station #2. After project construction, October 1998.

Figure 11. Looking downstream towards the bottom three structures across flooded bank at bankfull flow December 28, 1998.

Figure 12. Lower end of cut-bank suffering continued erosion after first bankfull flow event, November 1998.

Project Maintenance

In March 1999, additional material was added to the structures (see Figure 13). Placement of the material targeted structures that lacked sufficient wood debris to protect the bank interface. Material was also placed in active floodplain channels in order to increase floodplain roughness (Figure 14).

Figure 13. Adding material to structures in March 1999.

Figure 14. Adding material to floodplain in March 1999.

Project Monitoring

Prior to implementation, various attributes were recorded in order to assess change in the project over time. The following attributes were monitored:

1) Percent stream shade – using solar pathfinder
2) Percent bank stability
3) Quantity of LWD
4) Channel characteristics – a survey was conducted using a Total Station. Several cross-sections were established and provided for accurate width to depth ratios. Additionally, the stream profile was recorded. This information will be very useful in evaluating scour, pool formation, thalwag movement, bank erosion, aggradation, etc.

Status of the Projects Goals and Objectives

Goal/Objective	Status
Reduce W/D Ratios <30	Will re-survey cross-sections after phase II implementation
Increase Bank Stability to 80%	Bank Stability is 80%
Increase LWD >100 Pieces per Mile	LWD = 340 Pieces per Mile (within project area)
Increase Stream Shade >75%	Will Take Approximately 70 Years
Monitor Project Effectiveness	Ongoing
Educate the Public and local students	1. Conducted two Wind River Watershed Council tours at the Project Site. 2. Conducted project monitoring with Wind River Middle School's JETS class.

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Report F: Restoration -- Part II

Wind River Watershed Project

1998 Annual Report

November 1999

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Report F – Part II

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Introduction

The quality and quantity of salmonid habitat in the Wind River subbasin have been reduced by timber harvest, road building, and other land use activities within the watershed. In 1992, the American Fisheries Society rated summer and winter steelhead at a moderate and high risk of extinction respectively, and they listed the Wind River sea-run cutthroat trout as extinct (Nehlsen 1991). In 1997 Washington Department of Fish and Wildlife (WDFW) rated the Wind River summer run steelhead as critical. Wind River steelhead was listed as threatened under the Endangered Species Act (ESA) on May 18, 1998. Due to the status of this stock, the Wind River summer steelhead has the highest priority for restoration in the State of Washington's Lower Columbia Steelhead Conservation Initiative.

Stream surveys for 1989-1997, sub-basin assessments in 1992, and the Wind River Watershed Analysis (1996) were used to evaluate limiting factors in the Wind River. Fish habitat and water quality have been negatively impacted by past riparian timber harvest, stream clean-outs, road building and regeneration harvest within the rain-on-snow zone. Alluvial reaches within the main-stem Wind River and tributaries, which contain the majority of steelhead spawning habitat, have been significantly impacted. Many of these reaches were disturbed over 80 years ago, yet habitat and water quality have not recovered and in some cases are getting worse.

The goal of restoration efforts within the Wind River has been to accelerate the recovery of fish habitat and water quality by reducing road densities, reforesting, and rehabilitating riparian areas, flood plains, and stream channels. The U.S. Forest Service, U.S. Fish and Wildlife Service, and Underwood Conservation District have made significant progress in rehabilitating hydraulic processes and critical fish habitat. Since 1992, approximately 75 miles of road have been stabilized or "storm-proofed", 35 miles have been decommissioned, 120 acres of flood plain have been reclaimed, 300 riparian acres have been planted and 2,000 pieces of LWD have been placed back in 6 river miles of stream on National Forest land within the Wind River watershed.

In 1998 funding was secured from the Bonneville Power Administration (BPA) to assistance and accelerate restoration efforts on both public and private lands. This document details the accomplishments of riparian and road restoration projects completed with 1998 BPA rate-payer restoration funds.

The objectives of road decommissioning are: 1) restore the timing and magnitude of peakflows by eliminating overland and subsurface flow interception of roads. 2) Reduce road-related sediment and prevent mass fill failures associated with culvert plugging and incompetence.

The goals for riparian rehabilitation are to increase stream shade and potential LWD to provide a long-term self-maintaining ecosystem. The objectives are to increase growth rates and diversity of streamside vegetation.

Road Decommissioning

Methods

Monitoring of previous road decommissioning efforts within the watershed prompted modifications of the methodologies described in the USDA Forest Service "Guide for Road Closure and Obliteration, 1996". These modifications were made to prevent surface erosion of treated surfaces, reduce cost and promote re-colonization of native grasses and shrubs.

The 1998 Dry Creek decommissioning was accomplished by excavating culverts and laying back banks to a 1.5:1 ratio or natural contour were terrain permitted. Fill excavated from larger culverts was piled and contoured at pre-designated sites. The piled fill was then seeded with erosion control mix and mulched with straw to prevent surface erosion. Rehabilitated banks were planted with erosion-control, grass-seed mix and mulched. Rooted shrubs were planted the following spring. Large exposed banks had log /slash/ rock structures constructed at the toe of the slope. Banks were then seeded, mulched and treated with slash (coarse mulch) to prevent rilling and fine sediment from entering the water coarse. These banks were also planted with rooted shrubs the following spring. Road surfaces were "de-compacted" with the excavator bucket digging down to a minimum depth of 24" across the road surface. The disturbed road surface was mulched. Cross drains were placed on a site-specific basis to ensure proper spacing and appropriate outflow location. Access was blocked with a large "kelly hump" or berm.

Road decommissioning was accomplished in accordance with the State of Washington's Hydrualic permit, National Environmental Policy and the Endangered Species Acts.

Results and Discussion

Four and four-tenths road miles were decommissioned with BPA funds in 1998. Cost for decommissioning totaled $60,600 or $14,093/mile. Cost of previous road decommissioning projects within the Wind River and White Salmon watersheds ranged from $3,200/mile to $27,000/mile. The removal of two large culverts consumed 50% of the funds expended on the project. The removal of these culverts was necessary to prevent future mass failures, which had the potential to deliver approximately 30,000 cubic yards of sediment to spawning habitat in Dry Creek and the Middle Wind River.

Monitoring

The project area has weathered the first winter extremely well. No significant erosion was observed on de-compacted road surfaces, cross drains or culvert removal sites. The log and rock toes installed on the large culvert removal site is working as designed in preventing bank scour and erosion. Slash placed on the face of the slope is also working as designed and have prevented rills from developing on rehabilitated banks. Native vegetation is already re-colonizing the de-compacted road surface.

Figure 1. Slope stabilization of culvert removal for a tributary of Dry Creek, Skamania County, Washington.

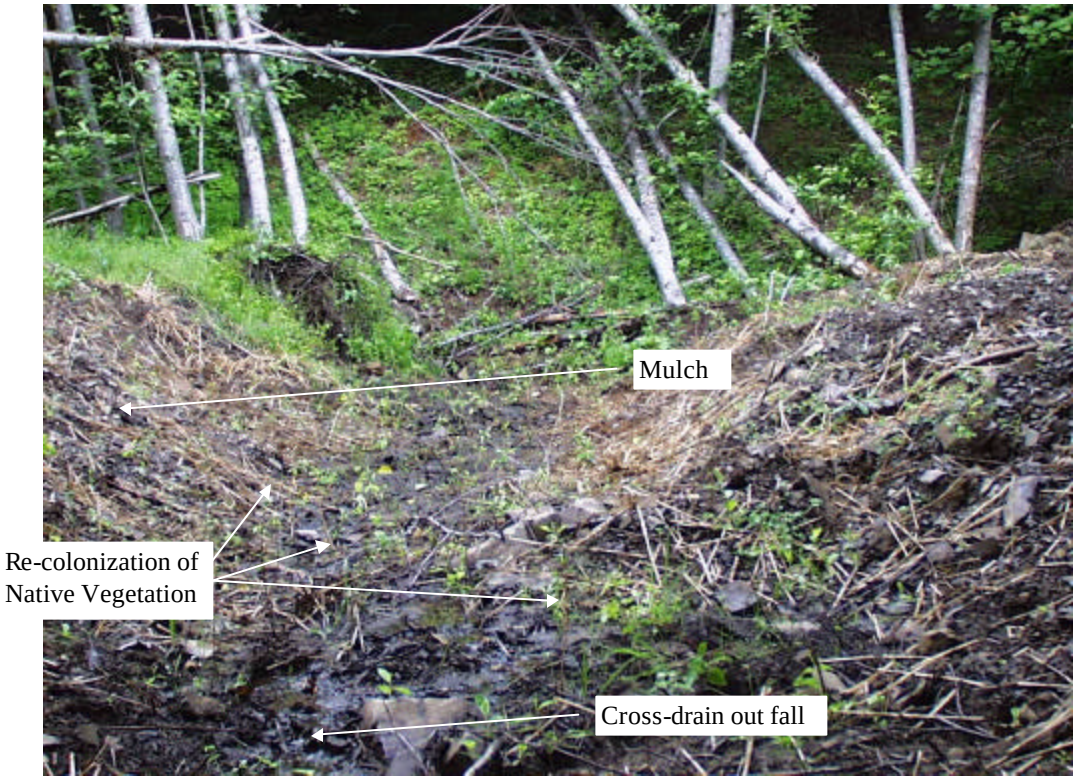

Figure 2. Cross drain on decommissioned Dry Creek road 64202, Skamania County, Washington.

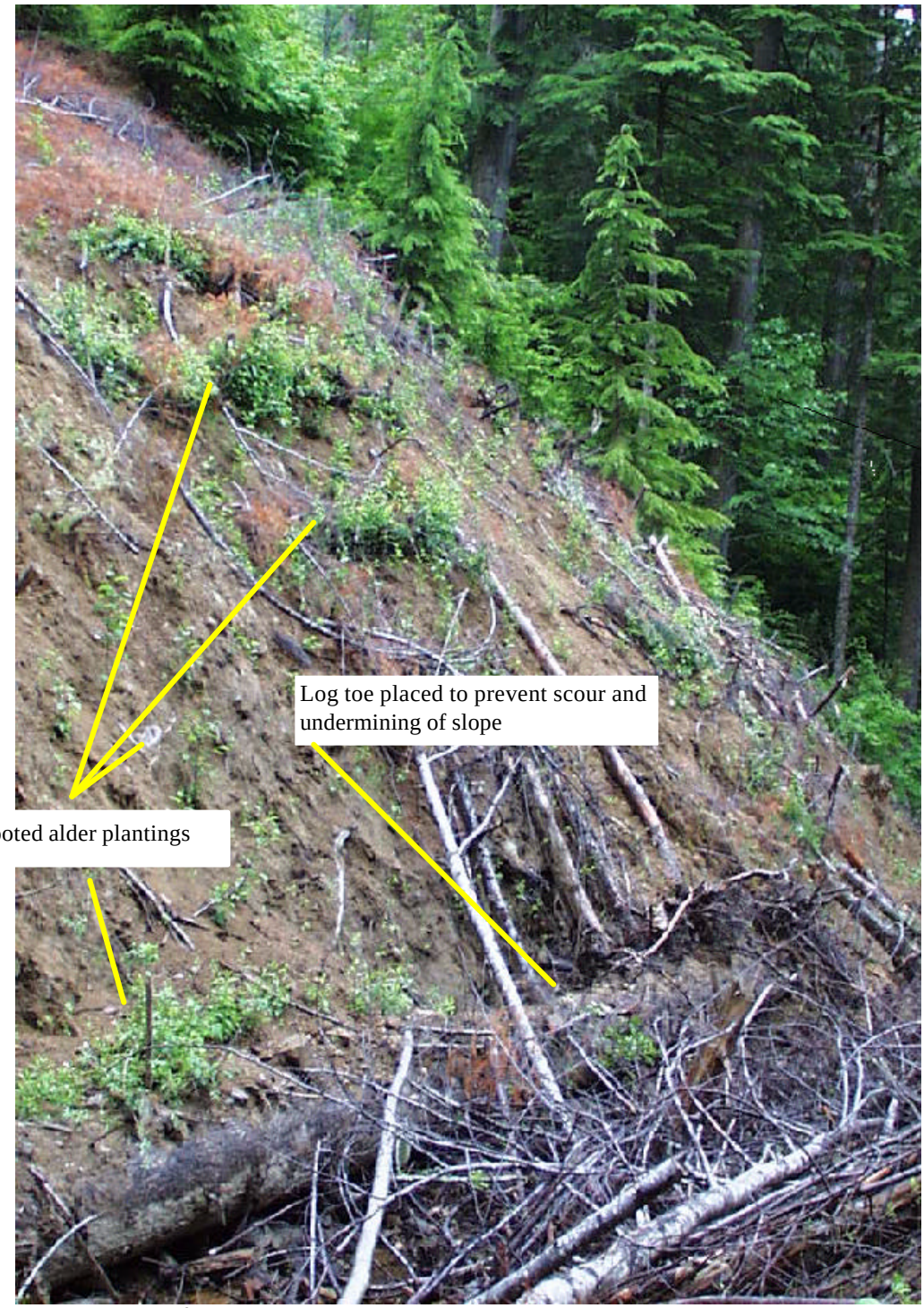

Figure 3. Toe stabilization of a culvert removal site on a tributary to Dry Creek, Skamania County, Washington.

Riparian Rehabilitation

Methods

Densely stocked riparian stands were thinned to increase stand vigor and diversity. Wind River silviculturist selected climax species such as western hemlock and western red cedar that were present in the existing riparian stands. Trees surrounding the climax species were thinned or topped to accelerate growth by reducing competition for sunlight and nutrients. Felled trees were left as down wood to increase terrestrial habitat. A sawyer was hired to climb approximately 40 feet up selected trees and "topped" to increase snag and roosting habitat.

Homogeneous stands of alder and Douglas fir were under planted with native conifers to increase stand diversity and provide a long-term source of large woody debris. Hand crews planted coniferous seedlings on 5 to 10 foot spacing during the spring months. Rooted willow stock was also planted on the lower banks and within the bankfull channel to increase channel stability and increase stream shade.

Results and Discussion

Approximately 75 riparian acres were evaluated, prescribed treatment and planned (including NEPA), 46 acres were thinned, 17 riparian acres were under-planted with conifers and one river mile of stream was planted with shrubs.

In the spring of 1998 46 acres along the Middle Reach of the Wind River were thinned and 17 riparian acres were under planted with 6000 grand fir and 2000 white pine along Crater, Compass and Trout Creek to diversify species and seral class. In 1994 the same area was planted with western red cedar and western hemlock within 200' of the low flow channel. The trees were planted at relatively high densities due to past monitoring within the watershed showed that mortality typically exceeded 60%. Mortality was attributed to browsing, floods and competing vegetation. To reduce mortality associated with browse, flexible nets and vexar tubes were placed on the more palatable species such as western red cedar.

Monitoring

Survival and growth plots were established for riparian plantings. Survival and growth will be evaluated on an annual basis for the next five years.

Figure 4. Hand crew planting rooted willow and red alder shrubs in deposition areas along Trout Creek, Skamania County, Washington.

Figure 5. Monitoring survival and growth at plot #2, Layout Creek, Skamania County, Washington.

Figure 6. Vexar tubing protecting western red cedar from deer and elk browse, plot #2 Layout Creek, Skamania County, Washington.

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Report G: Education

Wind River Watershed Project

1998 Annual Report

November 1999

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Introduction

Incorporating educational components into the watershed project is a crucial part of our efforts. Education components of the watershed project include:

1) Programs in local schools
2) Community outreach programs
3) Technical assistance to landowners

Progress on each of these components is described below.

Programs in Local Schools

Stevenson High School

Underwood Conservation District (UCD) and USDA Forest Service (USFS) staff assisted teacher Don McAndie with the development of a Streamwalk-type program in his Advanced Biology class in Fall 1998. The program is based on the "Sleuths" program model established by a school district in another part of the state. The program involves water quality monitoring, channel monitoring, and bio-assessment of the Wind River at select sites throughout the basin. Funds were provided to the class to purchase four continuous recording temperature-monitoring units and associated equipment and software. UCD and USFS staff presented an overview of the watershed project and current fisheries issues during two of the classroom sessions. UCD and USFS also assisted with at least one water quality monitoring field trip at the mouth of the Wind River. The class was instructed on the use of the UCD turbidimeter (on loan to the class), and on sediment sampling techniques used by the USFS. Macro invertebrates were collected using a number of field techniques. Benthic organisms were described in terms of their usefulness as biological indicators of water quality. Students gave presentations on their program at the October and November Wind River Watershed Council (referred to as Council hereafter) meetings.

Wind River Middle School

UCD staff performed one class lecture on the Wind River project to the Wind River Middle School Junior Environmental Trouble Shooters (JETS) class. Staff instructed the JETS class on installing a photo monitoring station at a restoration project on Martha Creek. The students took digital photos of the site, created a display, and presented their work at the May Council meeting. Students also conducted monitoring of the Stabler Cut-Bank project. UCD, USFS, and U.S. Fish and Wildlife Service personnel instructed the students on measuring bank erosion rates and photo monitoring.

In May 1998 and 1999, middle school students were given a tour of the smolt trapping on the Wind River drainage. Washington Department of Fish and Wildlife (WDFW) staff went through the purpose of the program, fish identification, and techniques used to handle and mark fish.

Figure 1. Wind River Middle School JETS students conducting monitoring of Stabler project, Spring 1999.

Carson Elementary

Technical assistance has been provided to Carson Elementary for various environmental education projects. A sum of $400 was provided to purchase an aquarium chiller unit to be used for a classroom salmon raising project. Technical assistance was provided by UCD to conduct a tree planting project on Carson Creek that involved approximately 40 school kids planting trees and shrubs to restore a degraded section of a local stream. Agency staff and community volunteers presented the kids with information on what makes a stream healthy and how to plant trees.

Logo contest

The UCD, in cooperation with USFWS, conducted a logo contest in local schools in order to obtain a Wind River Watershed Project logo. All of the schools that pull from watershed residents were targeted for participation. A total of 130 school kids submitted logos. The Council voted on the winners and cash prizes of $50, $25, and $10 were given for first, second, and third place. A photo of the three winners ran in the Skamania Pioneer newspaper. The winning student was a 12-year old at Wind River Middle School (see front cover for logo).

Community Outreach Programs

Outreach projects are designed to increase public awareness of, and involvement in, watershed activities and issues and consist of the following:

Brochures

Brochures describing the watershed effort and soliciting project ideas were sent to basin landowners via Public Utility District mailings. A total of 2,200 were sent in April 1999 (Figure 2). The USFS designed and published three information brochures for public distribution. The message of the publications focused on the Wind River and discussed three important issues facing the watershed, including: wild fish catch and release, maintaining a healthy riparian area, and recognition of steelhead throughout their life history. Approximately 300 brochures were distributed at USFS visitor centers and other public outlets.

Signs

Signs are being installed to inform watershed area residents and visitors of the location of watershed boundaries and streams. The goal is to inform people of their "watershed address", convey the concept of watersheds reaching beyond the river channel, remind people that their actions will affect downslope and downstream neighbors, and advertise the watershed project. See the watershed sign design in Appendix A.

Media

Advertising the project in the local paper and radio is an effective way to keep residents up to date on activities and to advertise specific events. A total of five articles relating to the watershed project have been published in the Skamania County Pioneer.

Community Events

Community events are conducted to involve the public in restoration, monitoring, or educational activities. They may include tree-planting events, trash clean-ups, fish snorkeling, fish education days, and others. A tree-planting event was conducted on April 26 and involved seven community volunteers helping plant trees along a degraded section of stream located on private land along the middle reach of the Wind River. A total of 105 tree seedlings were planted.

Fish Education Day

The USFS sponsored an environmental education event with a focus on fish. Educational components of the event featured fish identification, cultural significance of salmon in the Pacific Northwest, proper methods of handling fish and a living laboratory of aquatic organisms. The event was attended by approximately 200 kids ages 5-12.

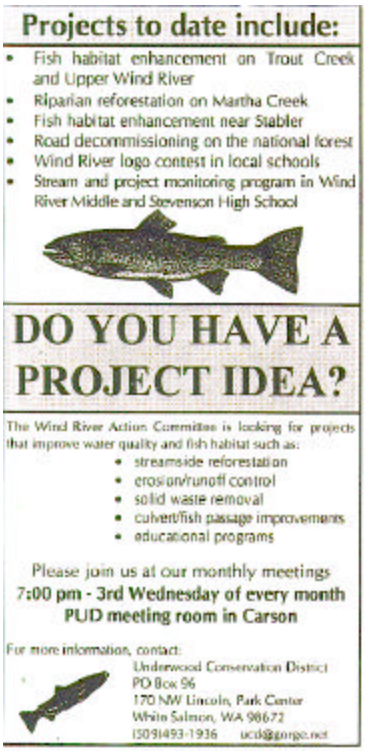
Snorkel Survey

WDFW and USFS co- sponsored the annual snorkel survey in August 1998. The purpose of the survey was to update index snorkel counts of hatchery and wild steelhead in the Wind River. USFS, USFWS, UCD, USGS-Columbia River Research Lab, Clark-Skamania Flyfishers, and others volunteered in the survey.

Professional Information Sharing

A group of Russian fisheries scientists were given a tour of the lower Wind River smolt trap in May 1999. WDFW and USFS staff went through the purpose of the program, fish identification, and techniques used to handle and mark fish.

Front



Back

Figure 2. Brochure sent with PUD mailings.

Technical Assistance

Technical assistance was provided via workshops and interaction with landowners. Each of these activities are describes below.

Workshops

UCD assisted Washington State University Cooperative Extension Service (WSU) to put on a Timber Stand Management Workshop in Fall 1998. Approximately 15 people participated in the one-day workshop, with four Wind River landowners and two UCD staff in attendance. UCD assisted WSU with a Coached Forest Management Plan Writing Course in April and May 1999. The eight day course was funded through a grant from UCD / Natural Resources Conservation Service and involved 16 participants. Four of these were Wind River watershed area landowners. These technical workshops are designed to assist forest managers with sustainable timber-stand management techniques and to assist landowners with developing stewardship plans for their forested lands.

Assistance to landowners

The UCD assists landowners involved with conducting restoration-type projects on their land. Site visits, technical information, and implementation assistance was

provided. From Fall 1998 to Spring 1999, the UCD provided technical assistance to three Wind River landowners planning watershed enhancement projects.

One project was the "Wind River Resort Project" at the mouth of the Wind River. UCD staff assisted the property caretaker with a proposed project, which involved placement of approximately 100 cubic yards of fill dirt in rocky, depressed areas to establish vegetation (grass and tees). UCD assisted the landowner with surveying and project recommendations necessary for permitting through Skamania County.

A second project was the "Uhlir Project", located at a private residence adjacent to the Wind River near Stabler. UCD staff assisted landowners with planning for a project involving streambank erosion control and reforestation at their home on the Wind River. The landowners were presented with on-site descriptions of measures that could be taken as well as relevant excerpts from technical manuals. Additionally, the UCD provided one bird box and one bat box to the landowners for placement on their property.

A third project was the "Cedar Creek Landslide Project", located near a private residence adjacent to Cedar Creek. UCD staff assisted the landowner with planning a project involving erosion control and bio-engineering on a landslide area adjacent to Cedar Creek near his home. The landslide may have resulted from timber harvest and a logging road constructed high on a steep slope above the creek, which were activities conducted by the previous landowner. The landowner was presented with on-site descriptions of measures that could be taken as well as relevant excerpts from technical manuals.

Appendix A

Watershed Identification Sign Installation in the Wind River Watershed

Introduction

The Wind River Watershed Restoration Project is a cooperative partnership of public and private stakeholders aimed at restoring fish habitat and water quality in the Wind River basin through voluntary measures. The UCD received funding from BPA to install watershed and stream identification signs along roadways throughout the basin as a component of the education/outreach portion of this watershed effort.

Goals

Inform watershed area residents and visitors of the location of watershed boundaries and streams in order to:

1) Inform people of their "watershed address".
2) Convey the concept of watersheds reaching beyond the river channel.
3) Remind people that their actions will affect downslope and downstream neighbors.
4) Advertise the watershed project.

Strategy

A total of 18 sites are planned along roadways at watershed boundaries and river crossings. Nine of these will be two directional. Sign placement will target high traffic areas. The signs will inform drivers of their entry into the basin and of significant stream crossings. Signs will be located at common transportation corridors used by residents and visitors. This includes roads that access residential areas and the Carson / Stabler urban areas. It also includes the Wind River Highway, which is a common transportation corridor for visitors traveling between Mt. St. Helens NVM and the Columbia River Gorge. Signs will be placed along other popular forest roads as well. The watershed project logo will be displayed on each sign.

Design

Figure A-1 depicts an example of a sign design. The logo is adapted from the Wind River Watershed project logo that was drawn by a Wind River Middle School student. Five of the signs will be 24" x 30" and 23 of the signs will be 18" x 24" non-reflective aluminum with vinyl or painted lettering. Most of the stream crossings consist of two signs, one facing each direction of travel. The watershed boundary signs are one directional, indicating entry into the watershed.

Figure A-1. Example of a sign design for watersheds within the Wind River drainage.